

This makes six species of *Calliste* now known to inhabit Central America and the Isthmus of Panama, viz. *C. larvata* from the hot forest-region of the Atlantic side of Guatemala, *C. Francescæ** from Costa Rica and Veragua, *C. Dowii* from Costa Rica, *C. Frantzii* from the same country, *C. gyroloides*, a species ranging from Costa Rica to Bolivia, and *C. inornata* from Panama to the Isthmus of Darien.

The single specimen of this *Calliste* now described was procured by Capt. J. M. Dow, Corr. Mem. Z.S., at San José, the capital of Costa Rica, during a short visit he paid to that city in the early part of the present year, and by him most kindly presented to me. He was unable to inform me exactly whence it came; but it was most probably obtained from the low forest-region of the Atlantic slope.

I dedicate the species to Capt. Dow, whose researches in the marine fauna of Central America are too well known for me to need to dilate upon the justice of the appellation.

OBSERVATIONS ON THE BOX TORTOISES, WITH THE DESCRIPTIONS OF THREE NEW ASIATIC SPECIES. BY DR. J. E. GRAY, F.R.S., ETC.

The knowledge of the animals of our own country is progressive and only gradually acquired; and how much more so must it be as regards the species which we receive from a distant country, whence we get only isolated specimens, and often in a more or less imperfect condition, without any account of how they live, and what they eat, and in what manner they conduct themselves!

In such cases how can we do more than guess at what is a species, and into what groups the species should be divided? and yet, because we doubt in what we are doing (and the older we become in the study, the more do we see the necessity for doubting, and the more do we see the imperfection of our materials)—yet, on the doubts which arise from such causes and not from any want of faith in the principle that species are permanent, if we only had materials enough to study them properly, do theorists wish to support the theory that species gradually pass into each other, and have been derived, or rather have originated, from such transformations. Never was a theory more baseless, as far as our knowledge is concerned.

This imperfection of our knowledge is specially the case with respect to exotic Tortoises, of which we sometimes only procure the shell, at other times the animal with the shell in a more or less perfect condition; and when the latter is procured, we find that the conclusions that we had come to as regards the probable form of the animal, or some part of it, are more or less incorrect, and we are thus obliged to reconsider the situation the species occupies in the series.

* I had considerable doubts whether this species was really separable from *C. larvata*, but, having examined a number of skins of both species, have come to the conclusion that the distinction, small as it is, is constant. Dr. Schlater has pointed out in his 'Monograph' what the differences are, to which I may add that *C. Francescæ* seems a lighter rather than a brighter bird than *C. larvata*; the blue on the forehead is a trifle broader in the former; and the outer bluish-green margin to the middle wing-coverts of the latter is almost obsolete in the former. In fact, there is just a difference, and that is all.

Having lately received more perfect specimens of some of the Indian Box Tortoises, I am induced to suggest their arrangement as follows :—

The Tortoises belonging to the tribe *Cistudina* are characterized by having the sternum attached to the back by a ligamentous suture on each side, and divided across the centre by a similar cross suture, leaving the front and hind lobe more or less moveable.

In the *normal Cistudinæ*, which have the lobes of the sternum moveable at all ages, the cartilaginous sutures and the suture between the pectoral and ventral shields of the sternum are at the same situation; and the lobes of the sternum are broad, as broad as the opening of the thorax, and cover the legs when they are contracted.

The *normal Cistudinæ* may be divided into genera, according to the more or less aquatic habits of the animal, as indicated by the structure of the feet.

- I. *Sternum-lobes unequal; front shorter, almost free from the symphysis. The hind foot slender, elongate; toes very unequal, second longest.* N. America.

1. CISTUDO.

Thorax convex, solid; sternum rounded or truncated before and behind; the front lobe smaller, almost free from the symphysis. The fore legs with large shields in front; the toes short, enclosed, not webbed, with short conical claws. The hind feet elongate, narrow, with the second toes produced; the rest short, nearly enclosed, not webbed; the soles of the feet with subequal moderate-sized scales, the hinder edge rounded.

N. America.

- * *The hind feet with small hinder or outer fourth toes.* Cistudo.

CISTUDO CAROLINA, Gray, Cat. Shield Rept. B.M. p. 39.

Of which *C. ornata* and *C. major*, Agassiz, seem to be varieties.

- ** *The hind feet without any small fourth toes.* Onychotria.

CISTUDO MEXICANA, Gray, Cat. l. c. p. 40.

See also *C. triunguis*, Agassiz, which is said to be smaller than *C. carolina* and *C. mexicana*.

Dr. Holbrook describes and figures *Cistudo Blandingii* (t. 3) as a separate species, because it has a head like *Emys*, the upper jaw deeply emarginate in front, the front lobe of the sternum less elevated. On these characters Leconte refers it to *Lutremys*, and Agassiz to *Emys*, as restricted by Bonaparte, who regards *E. europæa* as the type. The figures of Holbrook look very like *Cistudo carolina*; but Agassiz, who forms for it a subfamily, describes it as much more depressed. It is probably distinct; but I have never seen an American Box Tortoise that could be arranged or confounded, as Leconte has done this, with our European *Lutremys*. It certainly is not *E. Meleagris* of Shaw, as Agassiz believes.

II. *Sternum-lobes subequal, both forming part of the lateral symphysis.* The Old World.

i. *Hind foot elongate; toes very unequal, nearly free, second longest.*

2. PYXIDEA.

The thorax convex, solid. Sternum flat; lobes rather narrow, truncated in front, notched behind. Legs with large band-like thin shields in front; toes short, scarcely exerted, with band-like shields above, slightly webbed. The hind feet rather elongate: toes slightly webbed, short; the second rather elongate, produced, with a large claw. Claws conical, acute.

PYXIDEA MOUHOTII.

Cyclemys Mouhotii, Gray, Ann. & Mag. N. H. 1862, x. p. 157.

Hab. Lao Mountains, Siam.

The back is flattish and sharply three-keeled.

ii. *The hind foot elephantine; toes subequal.*

3. CISTOCLEMMYS.

Thorax convex, solid. Sternum nearly flat, rounded before and behind; the front lobe large, partly enclosed in the symphysis. The fore feet subclavate; the toes very short, nearly enclosed, not webbed; the claws short, blunt. The hind feet elephantine, subcircular; toes very short, enclosed. Soles with two series of large prominent shields; the hinder edge keeled, but scarcely produced. Tail shielded beneath. Asiatic.

This genus, in the convex and solid structure of the thorax, is like *Cistudo*; but the foot is more like that of the Land-Tortoises; and the hind foot is subcylindrical, instead of elongate as in the American genus.

CISTOCLEMMYS FLAVOMARGINATA.

Dark brown, shields of the back deeply concentrically grooved; the sternum flat, black; the lower side of the margin of the thorax yellow; head olive, temple yellow, with a yellow streak on each side of the crown, becoming wider and triangular behind.

Cuora trifasciata, var., Gray, Cat. Shield Reptiles in B.M. p. 42. Specimen c.

Hab. China (*J. Reeve, Esq.*); Formosa (*R. Swinhoe, Esq.*).

The surface of the shell is often more or less eroded; the one which we first received from Mr. Reeve was so on the whole upper surface. The form of the foot, as well as the height and thickness of the shell, at once separates this species from *Cuora trifasciata*, with which I formerly confounded it.

Mr. Swinhoe informs me that this Tortoise is very abundant in the ponds in the district of Tamsuy, N.W. Formosa. He did not fall in with it in South Formosa, where the *Emys Bennettii** is the prevailing species. He has frequently seen the Tamsuy Tortoise showing its head and the top of its back on the surface of the water

* *Emys sinensis* proves to have been founded on the young state of this species, as is shown by the fine series of specimens brought from Formosa by Mr. Swinhoe.

in ponds about the rice-fields, and has watched them basking, several at a time, on the tops of large stones in such ponds.

- iii. *The hind feet flattened, fringed; toes webbed and with band-like shields above.*

4. CUORA.

The thorax rather convex, more or less three-ridged. The sternum flat; lobes subequal, both enclosed in the symphysis. Head flat at top; eyes lateral. The front of the fore legs with large scales. The toes all banded above, webbed. The claws conical. The hind feet depressed; the hinder edge fringed and angularly produced. Asiatic.

- * *The head large, flat, with two yellow streaks on each side; back one-coloured; toes broadly webbed.* Cuora.

CUORA AMBOINENSIS, Gray, Cat. Shield Reptiles B.M. p. 41.

Hab. Amboina; Gilolo (*Wallace*); Borneo (*Wallace*).

- ** *Head smaller, oblong, with two dark streaks on each side; back three-banded; toes narrowly webbed.* Pyxiclemmys.

CUORA TRIFASCIATA, Gray, Cat. Shield Rept. B.M. p. 42.

Hab. China.

5. LUTREMYS.

Thorax depressed. Sternum flat; lobes subequal, both enclosed in the symphysis. Head ovate; eyes superior. The legs with large scales in front. The feet depressed; toes webbed, banded above; the hind feet fringed and angularly produced behind. Claws elongate, acute.

LUTREMYS EUROPÆA, Gray, Cat. Shield Reptiles B.M. p. 40.

Hab. Europe.

Very variable in colour.

- iv. *Toes webbed; they and legs covered with very small scales; front legs only with thin band-like plates in front; the lobes of the sternum narrow.*

6. NOTOCHELYS.

Back convex, flattened above. The sternum flexuous; lobes rather narrow, truncated in front and behind. The legs and toes covered with minute scales; the front legs having a series of broad, thin, band-like shields in front. Toes webbed. Claws acute.

This genus is like a true *Emys* in most of its characters; but the sternum is scarcely raised above the underside of the margin, and is united to the thorax by a cartilaginous symphysis; the lobes are separated by a straight depressed suture, but scarcely moveable. It differs from all the other *Cistudinæ* in the legs and toes being covered with minute lanceolate scales as in *Batagur*, with only a few very narrow shields near the claws.

NOTOCHELYS PLATYNOTA.

Emys platynota, Gray, P. Z. S. 1834, p. 54.

Cyclemys platynota, Gray, Cat. Shield Reptiles B.M. p. 43.

Hab. Sumatra; Singapore (*Wallace*).

The head with a pale streak on each side, extended down the upper part of the sides of the neck.

The young specimens have one small black spot on the back edge of the areola of the costal, and two on the back edge of the areola of the vertebral plates.

In the *aberrant Cistudinæ* the lobes are only moveable in the young state; the suture that divides the bones of the sternum into two parts is straight and transverse, while the front edge of the pair of ventral shields overlaps its edge and forms a sinuous line in front of the suture. The lobes of the sternum are narrower than the opening of the thorax, as in *Emys*, and do not cover the legs when they are contracted.

This genus forms the transition to the Tortoises with solid and fixed sternum; but it is easily known from them by the sternum being scarcely raised above the margin of the thorax, and by the existence of the cartilaginous sutures between the sternum and thorax.

7. CYCLEMYS.

The thorax convex or depressed. The sternum flat or slightly convex, with the lateral symphysis well marked, truncated before and notched behind; the cross suture indistinctly marked and narrow, more or less obliterated in the adult, covered with the produced front edge of the ventral shields. The legs covered with large, band-like, thin plates in front. The toes banded above; the front one short, webbed. The hind feet flattened, with the toes broadly webbed; the hinder edge keeled and angularly produced.

* *Thorax depressed, suborbicular.*

1. CYCLEMYS ORBICULATA, Bell, P. Z. S. 1834, p. 17.

Cyclemys dentata (adult), Gray, Cat. Shield Reptiles B.M. p. 42, t. 19.

Shields brown-rayed.

Hab. Java.

The small figure of *Emys dentata* of my 'Illustrations of Indian Zoology' represents, I think, probably the young of *Geoemyda grandis*, Gray (Ann. & Mag. N. H. 1860), judging by the series of specimens brought by M. Mouhot from Camboja. The larger figures are those of a young *Batagur*.

** *Thorax oblong, convex.*

2. CYCLEMYS OLDHAMII.

Thorax oblong, convex; back flattened, bluntly keeled, and with a convexity in front, and two acute prominences at the end of the two last vertebral shields; costal plates rather convex, with the areola on the upper hinder margin; shields concentrically striated, brown, with some black lines on the part of the costal shield near the lateral keels; margin toothed behind. Thorax flat; shields pale, with dark rays.

Cistudo dentata (adult), Gray, P. Z. S. 1856, p. 183; Bell, Testudinata, t. (with animal)?

Hab. Mergui (*Professor Oldham*); Siam (*M. Mouhot*).

I was formerly inclined to believe this was an adult of the former species; but we have lately received a second specimen, which proves that it is perfectly distinct.

3. CYCLEMYS OVATA.

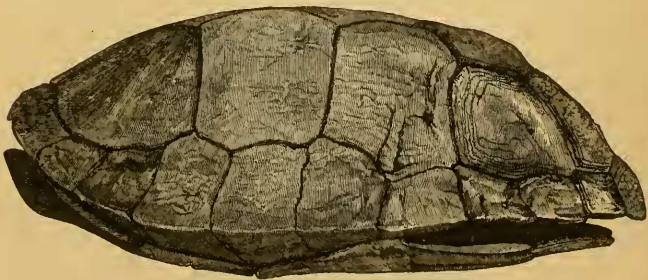
Thorax ovate, grey-brown, convex, hinder edge acutely dentated; the middle of the back rather flattened, bluntly keeled in front and above, and acutely keeled on the shelving hinder parts; the side shelving, the front slightly and the hinder part rather deeply impressed; the upper part of the costal plates convex; the sternum pale grey-brown.

Hab. Sarawak (*Wallace*, no. 138).

The specimen is not in a good state; probably the animal had been in confinement and was out of health; the cross suture on the sternum is much eroded on the edge, and the shell seems to be discoloured.

There is a second specimen, which was presented to the British Museum by Sir Andrew Smith, C.B., without any habitat, which is perhaps a younger stage of the species; but it does not show any mark of the transverse suture on the sternum, and the marginal plates are all broad and equally so, while, in the specimen from Borneo, the fourth, fifth, and sixth lateral marginal plates are much broader than the others on each side, and ascend up into the margin of the costal ones; and the sides of the shell are rather more convex in front, and only slightly and not so deeply impressed behind.

The shell is uniform pale brown above, and brown below, with regular close radiating paler rays, which are wider and more distinct



near the margin of the shield. The areola on the vertebral shield is close to the hinder margin, near the upper hinder angle of the costal shields, and it is near but not on the hinder outer edge of the sternal shields.

The dried animal is brown; the front edge of the fore legs is covered with irregular-sized scales.

Mr. Bell, in his '*Testudinata*,' gives two figures of the underside of the shell of his *Cyclemys orbiculata*; and in his text says that he

cannot assent to M. Bibron's referring this species to the genus *Cistudo*. These undersides evidently represent two distinct species; and the upper figure of the two shows the very cross suture the existence of which Mr. Bell denies.

The lower figures represent the sternum of *Cyclemys orbiculata*, with the lobes, especially the hinder ones, narrower than the openings in the thorax.

The upper figure represents a species where the lobes are broad and rounded, and nearly as broad as the aperture in the thorax.

It indicates the existence of a species which has not occurred to me, and to which the name of *C. Bellii* may be applied. Perhaps it is one of the specimens which he received from either Madras or Bombay; for he says he has received them from those countries as well as from China; and I have not seen any specimens of the genus from either of these two localities.

All the three specimens of this species in the British Museum have the lobes of the sternum narrow, like the lower figure. The figure of the shell with the animal in Mr. Bell's work better represents *Cyclemys Oldhamii* than the depressed, flattened *C. orbiculata* of Java.

MISCELLANEOUS.

Notes on Pustularia rosea, Gray, and Hyalonema.

By Dr. J. E. GRAY, F.R.S. &c.

IN Mr. Dallas's translation of Prof. Schultze's paper on *Polytrema minaceum* (Annals, ser. 3. vol. xii. p. 411), it is stated that I have given to *Polytrema minaceum* the new name of *Pustularia rosea*. This is a mistake: *Pustularia* is quite distinct from *Polytrema*. The latter genus is well known to me. *Pustularia*, if a Foraminifer, is nearly allied in external form to the genus *Lepralia*, and very unlike the massive *Polytrema*.

Having my pen in my hand, I may observe that I cannot agree with Prof. M. Schultze in regarding the spicula in *Carpenteria* or *Polytrema* as parasitic and part of a Sponge, any more than I can agree with him and Dr. Bowerbank in regarding the fibres of *Hyalonema* as the spicula of a Sponge which is covered with a parasitic *Zoanthus*.

Note on Ophiolepis gracilis (Allman), from the Brick-Clay of Seafield. By ROBERT WALKER.

Specimens of this Starfish were found for the first time, about a year ago, in brick-clay near Dunbar. Prof. Allman described the species at a meeting of the Royal Society of Edinburgh, in March last. The following remarks will show the condition of the Seafield specimens, and may assist in determining the species, if found in other quarters.

None of the specimens have the disks sufficiently preserved to show clearly the arrangement of the dorsal plates; and in one or two instances only can the form of the radial shields be made out. Their